031600 AMC

Republic Steel Corporation
General Offices: Republic Building
Environmental Control
PO Box 6778
Cleveland OH 44101

Republicsteel

March 17, 1982

WL West
Director
WB Tucker Jr.
Assistant to the Director
CM Brown
Assistant Director—Air

Mr. Sudhir V. Desai
Manager, Permits Section
Division of Air Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62706

Dear Mr. Desai:

In connection with the compliance tests called for under the Illinois Environmental Protection Agency Permit-to-Construct (Application No. C811017, I.D. No. 031600 AMC) a new coke oven battery at the Chicago District Plant of Republic Steel Corporation, particulate emission tests were performed on February 10, 1982 by The Almega Corporation on the underfire exhaust stack of the battery. A copy of the test report is enclosed.

The test results show an average particulate concentration of 0.007 gr/dscf of exhaust gas. This complies with the 0.03 gr/scf limitation of Condition 6b of U.S. EPA PSD Permit-to-Construct EPA-5-79-A-9.

As requested by Illinois EPA, attached are Tables I and II showing underfire gas analysis and push/charge cycle times respectively and the following supplemental information relative to the test period.

1) desulfurized coke oven gas underfiring rate: 310,000 acfh
2) ovens charged: 13
3) ovens pushed: 14
4) tons of coke per oven: 19.7

Please let me know if there are any questions concerning this submittal.

Yours very truly,

C. M. Brown

C.M. Brown

CMB:EJP
Enc.
c.c. - Messrs. D.A. Ullrich, U.S. EPA, Reg. V (enc.)
D.J. Goodwin, IEPA
Sy Levine, IEPA (enc.)
P. Orlinsky, IEPA
J.F. Ward

TABLE I

Republic Steel Corporation - Chicago District
Coke Battery Underfire Gas Analysis

Composite Sample	2:00 to 4:00 pm February 10, 1982
CO_2	2.41%
O_2	0.02
CO	5.65
H_2	54.26
Illuminants	0.36
CH_4	29.10
C_2H_6	4.91
N_2	4.21
Gross Btu	559.

TABLE II

February 10, 1982

Republic Steel Corporation - Chicago District

Coke Battery Operating Data

Oven No.	Time Charged	Time Pushed	Coking Time
10	11:10 AM	10:35 AM	28 HR 30 MIN
12	11:35 AM	10:50 AM	27 HR 55 MIN
14	11:45 AM	11:00 AM	27 HR 45 MIN
16	12:00 N	11:30 AM	27 HR 45 MIN
18	12:15 PM	11:40 AM	27 HR 45 MIN
20	12:45 PM	11:55 AM	25 HR 50 MIN
22	1:10 PM	12:10 PM	28 HR 00 MIN
24	1:25 PM	12:25 PM	28 HR 00 MIN
26	2:05 PM	12:55 PM	25 HR 10 MIN
28	2:30 PM	1:15 PM	25 HR 35 MIN
30	2:55 PM	1:30 PM	26 HR 10 MIN
32	3:20 PM	2:10 PM	26 HR 10 MIN
34	3:36 PM	2:55 PM	26 HR 10 MIN
36	3:56 PM	3:10 PM	26 HR 15 MIN
38	4:10 PM	3:25 PM	26 HR 08 MIN
40	4:22 PM	3:45 PM	25 HR 59 MIN
42	4:39 PM	4:10 PM	25 HR 42 MIN
44	4:56 PM	4:19 PM	25 HR 40 MIN
46	5:10 PM	4:30 PM	25 HR 45 MIN
48	5:30 PM	4:50 PM	25 HR 50 MIN

The Almega Corporation

Particulate Emissions Testing
Coke Battery Underfire Stack
Republic Steel Plant: Chicago, Illinois
The Almega Corporation Project I-5609

The Almega Corporation

607 C Country Club Drive
Bensenville, Illinois 60106
Phone: (312) 595-0175

February 16, 1982

Republic Steel Corporation
P.O. Box 6778
Cleveland, Ohio 44101

Attention: Mr. Tom Harlan
Environmental Dept, Room 519R
Subject: Particulate Emissions Testing
Coke Battery Underfire Stack
Republic Steel Plant: Chicago, Illinois
The Almega Corporation Project I-5609

Gentlemen:

Particulate emissions testing was conducted on the underfire stack serving the new coke battery at Republic Steel in Chicago, Illinois on February 10, 1982.

Purpose of this formal agency witnessed test series was to determine degree of compliance of this unit with appropriate State of Illinois and Federal EPA particulate emissions regulations.

Test methods followed those as detailed in The Code of Federal Regulations, CFR 40.

Testing was performed by Mr. H.M. Taylor and Mr. B. Holtz of The Almega Corporation.

This report summarizes the test methods and findings of this test series. Attached as appendices is a complete documentation of all methodologies, field test and analytical data and calculation summaries.

SUMMARY OF TEST METHODS

Particulate emissions testing was conducted on the underfire stack serving the new coke battery at Republic Steel in Chicago, Illinois on February 10, 1982.

Test methods followed those as detailed in The Code of Federal Regulations, CFR 40 (Ref. 1).

The selection and location of the sampling points followed the CFR 40 Method 1 (Ref. 1) included in Appendix A. Testing was conducted in the four sampling ports provided in this 20 ft. 14/16 in. I.D. stack located approximately 150 ft. above the breeching. At this location, 12 sampling points were required. Specifically, sampling was conducted for six minutes at each of three points on four radii making a total of twelve points and a test run duration of 72 minutes.

The stack gas velocity was determined using an S type pitot tube and followed the CFR 40 Method 2 (Ref. 1) included in Appendix B.

Stack gas Orsat samples were taken following the CFR 40 Method 3 (Ref. 1) included in Appendix C for determination of CO_2 and O_2 and molecular weight.

The stack gas moisture was determined following the CFR 40 Method 4 (Ref. 1) included in Appendix D.

Stack gas particulate concentration and emission rate was determined following Method 5 of the CFR 40 (Ref. 1) included in Appendix E. The gas velocity, moisture determinations and Orsat analyses were conducted simultaneously with the particulate emissions testing.

The particulate catch included nozzle, probe, cyclone, prefilter washings and filter particulates.

The collected samples were first dried at lab ambient temperature then dessicated and weighed to constant weights. The samples were then oven dried at 105°C for 3 hours and weighed. Both weights are recorded in Table 1 and the oven dried weights were used in the final emissions calculations.

A Joy Manufacturing, Western Precipitation Division EPA Method 5 sampling train was used for this test series.

Three test repetitions were conducted. A stainless steel lined probe of 12 ft. effective length and a 0.5 in. I.D. stainless steel sampling nozzle were used throughout the test.

SUMMARY OF TEST RESULTS

The results of this test series are summarized in Table 1.

The particulate field test data, calculation summary data, and laboratory analysis summary data sheets are included in Appendix F.

Test equipment calibration data is included in Appendix G.

DISCUSSION OF TEST RESULTS

The following stack particulate concentrations and emission rates were determined for the test series:

Test Repetition No.	Test Time	Particulate Concentration (gr/scf db)	Particulate Emission Rate lbs/hr)
1	11:00am-12:27pm	0.0067	6.40
2	1:03pm- 2:21pm	0.0051	4.96
3	2:35pm- 3:56pm	0.0094	9.14

CONCLUSION

Particulate emissions testing was conducted on the underfire stack serving the new coke battery at Republic Steel in Chicago, Illinois on February 10, 1982.

Test results indicated stack particulate concentrations of 0.0067, 0.0051 and 0.0094 grains/scf db and emission rates of 6.40, 4.96 and 9.14 lbs/hr for test repetitions #1, #2, and #3, respectively.

The Almega Corporation is pleased to have been of service to Republic Steel Corporation.

Respectfully submitted,

THE ALMEGA CORPORATION

H. M. Taylor

The Almega Corporation

SUMMARY OF EMISSION TEST DATA

TABLE: 1

PLANT: Republic Steel: Chicago, Illinois

LOCATION: Coke Battery Underfire Stack

OPERATOR: H.M. Taylor and B. Holtz

REPETITION #:	1	2	3
TEST DATE:	February 10, 1982		
STACK GAS			
Temperature, average ^{o}F	278.0	279.4	278.3
Velocity average fps	9.63	9.80	9.85
Volume flow x 10^3 acfm	182.87	186.11	186.97
Volume flow x 10^6 scfh db	6.66	6.78	6.83
Moisture %	12.85	12.65	12.51
Av. CO_2 %	5.90	6.17	6.13
Av. O_2 %	9.40	9.37	9.40
PARTICULATE SAMPLE			
Time, hrs: mins.	1:12	1:12	1:12
Volume scf db	32.57	33.14	33.26
Particulates collected mg (oven dried)	14.2	11.0	20.2
Particulates collected mg (dessicated)	19.9	13.8	23.6
Isokinetic Ratio, I% $90 \leq I \leq 110$	94.67	94.64	94.24
PARTICULATE			
Concentration grains/scf db	0.0067	0.0051	0.0094
x 10^{-6} lbs/scf db	0.96	0.73	1.34
Emissions lbs/hr	6.40	4.96	9.14

REFERENCES

1 The Code of Federal Regulations CFR 40, Part 60, 1980

APPENDICES

A	Method 1 -- Sample and Velocity Traverses for Stationary Sources
B	Method 2 -- Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
C	Method 3 -- Gas Analysis for Carbon Dioxide, Excess Air and Dry Molecular Weight
D	Method 4 -- Determination of Moisture in Stack Gases
E	Method 5 -- Determination of Particulate Emissions from Stationary Sources
F	Particulate Field Test Data, Calculation Summary Data and Laboratory Analysis Summary Data Sheets
G	Test Equipment Calibration Data